



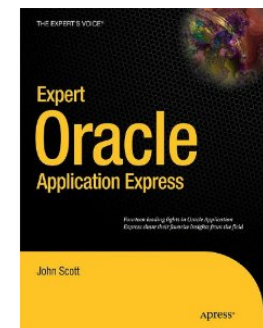
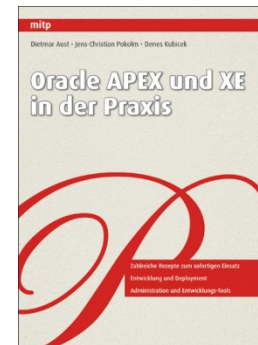
# Reporting Solutions for Oracle APEX - Choose Your Weapons

Dietmar Aust  
Opal-Consulting, Köln  
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# Vorstellung Opal Consulting


- ▶ Building Oracle based Web Applications since 1997
  - Portal, Forms, Reports, OWA Toolkit, now APEX!
- ▶ Dipl.-Inform. Dietmar Aust, Freelance Consultant
  - Master's Degree in Computer Science (MSCS)
- ▶ 1997-2000: Consultant at Oracle Germany
- ▶ Since 09/2000: Freelance Consultant, Since 2006 – APEX only!
- ▶ Blog: <http://daust.blogspot.com/>
- ▶ Regular presenter at Oracle conferences (ODTUG, DOAG, OOW)
- ▶ Author of the JasperReportsIntegration toolkit
  - <http://www.opal-consulting.de/tools>



# Major Use Cases

# Major Use Cases

## 1. Standard Reporting

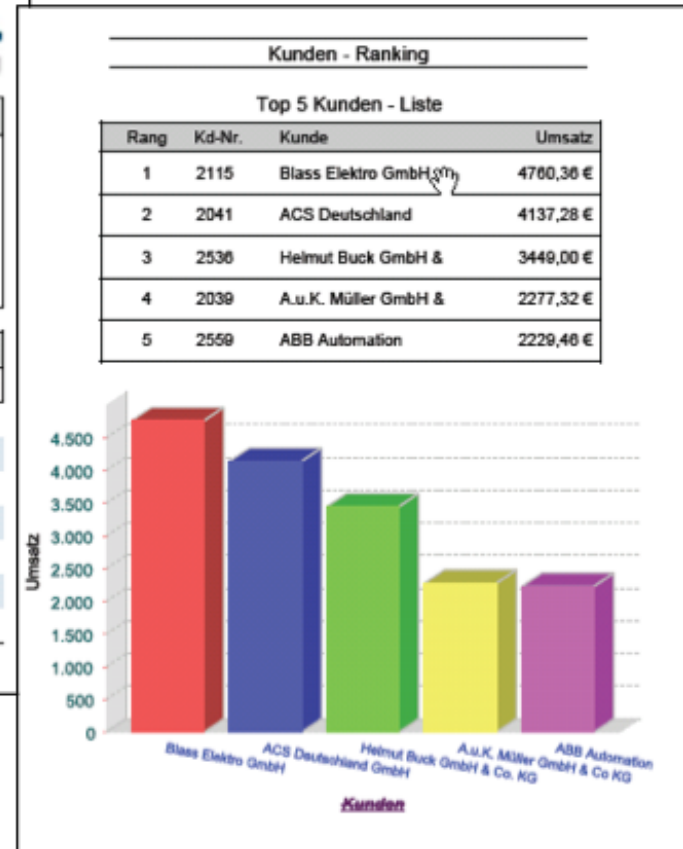


Angebot vom 18.03.2008

Angebot		Kunde	
Angebot Nr.:	50017/1	Kundennr.:	2115
Status:	Angebot erstellt	Kunde:	Blass Elektro GmbH
Erstellt:	01.03.2008(DENES.KUBICEK)	Strasse:	Industriestraße 4
Aktualisiert:	09.03.2008(DENES.KUBICEK)	PLZ / Ort:	96349 / Steinwiesen

Artikel					
Nr.	Artikel	Anzahl	Preis	Rabatt [%]	Summe
1	HTML und WEB	2	€ 21,91	32,00	€ 29,80
2	PL / SQL	5	€ 19,79	12,00	€ 87,08
3	ApEx	3	€ 49,45	6,00	€ 139,45
4	ApEx	1	€ 31,49	0,00	€ 31,49
5	PL / SQL	32	€ 40,92	5,00	€ 1.243,97
6	Österreichische Küche	31	€ 13,99	3,00	€ 420,68
7	Französische Küche	12	€ 259,99	10,00	€ 2.807,89
<b>Gesamtsumme:</b>					<b>€ 4.760,36</b>



# Major Use Cases

## 1. Standard Reporting

### ▶ What is it / Examples?

- Creating Invoices, Order Confirmations, Contracts
- Management reports / dashboards / charts



### ▶ Characteristics

- Client-independence, can possibly be downloaded from your website
- Not easily modifiable
- Need pixel perfect layout / corporate design
- Fixed layout, infrequent changes
- Generate as BLOB, can be stored in the database together with the client / order entry, etc.

# Major Use Cases

## 2. Flexible Reporting



### ▶ What is it / Examples - two situations:

1. Generating a MS Word document for further modification (e.g. flexible customer communication), E.g. flexible offer creation where you need to add calculations from MS Excel or add images, etc.
2. The template does already exist as a MS Word document

### ▶ Characteristics

- Needs to be modifiable after the generation
- Corporate design still important
- Possibly frequent changes in the template

# Major Use Cases

## 3. Data Export

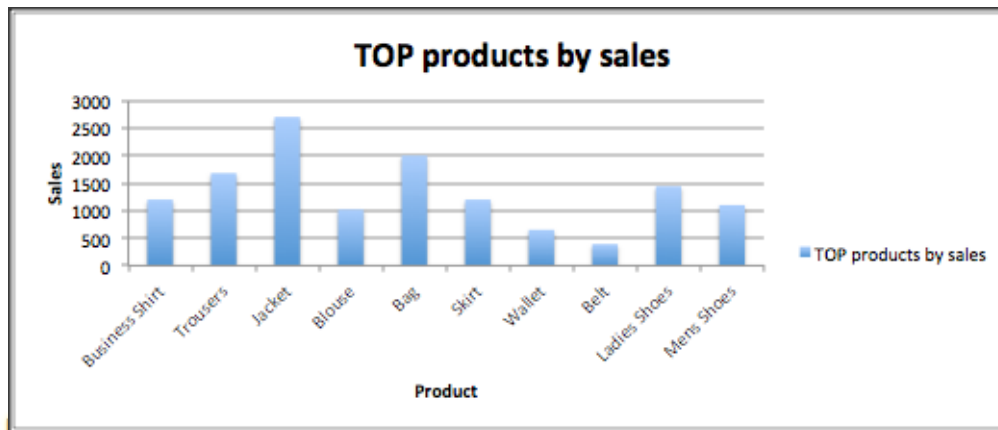
### ▶ What is it / Examples?

- The users want to export the data to further process it



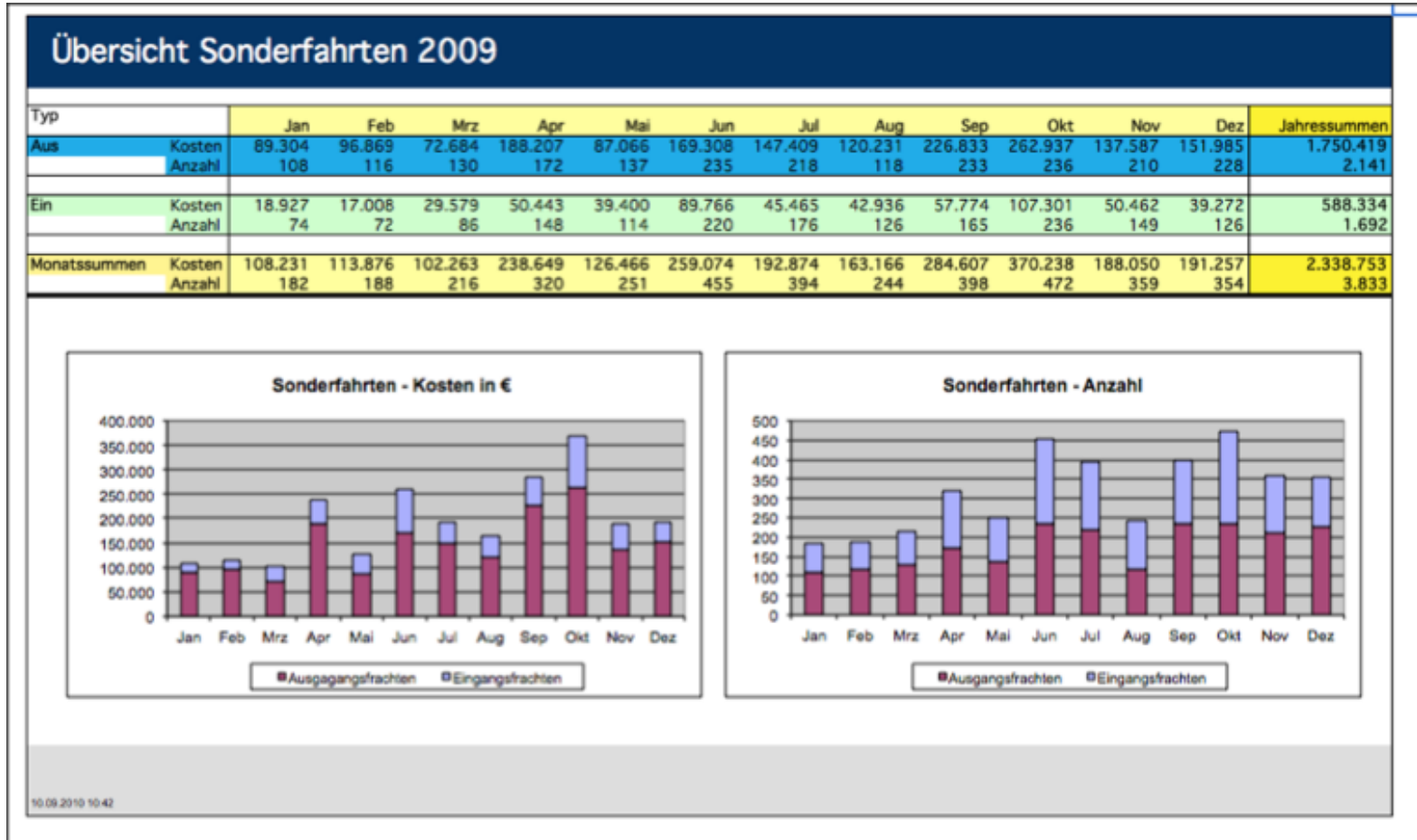
### ▶ Characteristics

- Proper data types – CSV format problematic
- Perhaps formatting
- Export multiple worksheets at the same time
- Using native features like autofilter, macros, conditional formatting
- Show / hide columns
- Charts, Pivot-tables, password protection for files and worksheets



# Major Use Cases

## 3. Data Export





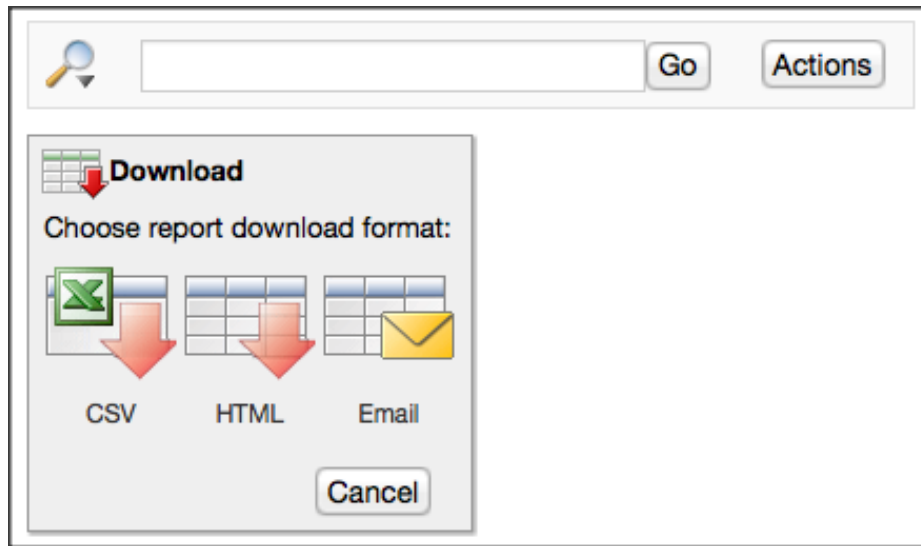
# Integration Strategies for APEX

# Integration Strategies for APEX

## 1. Out of the Box

▶ APEX out-of-the-box support :

▶ Interactive Reports:



▶ Classic Reports:

- CSV
- XML

# Integration Strategies for APEX

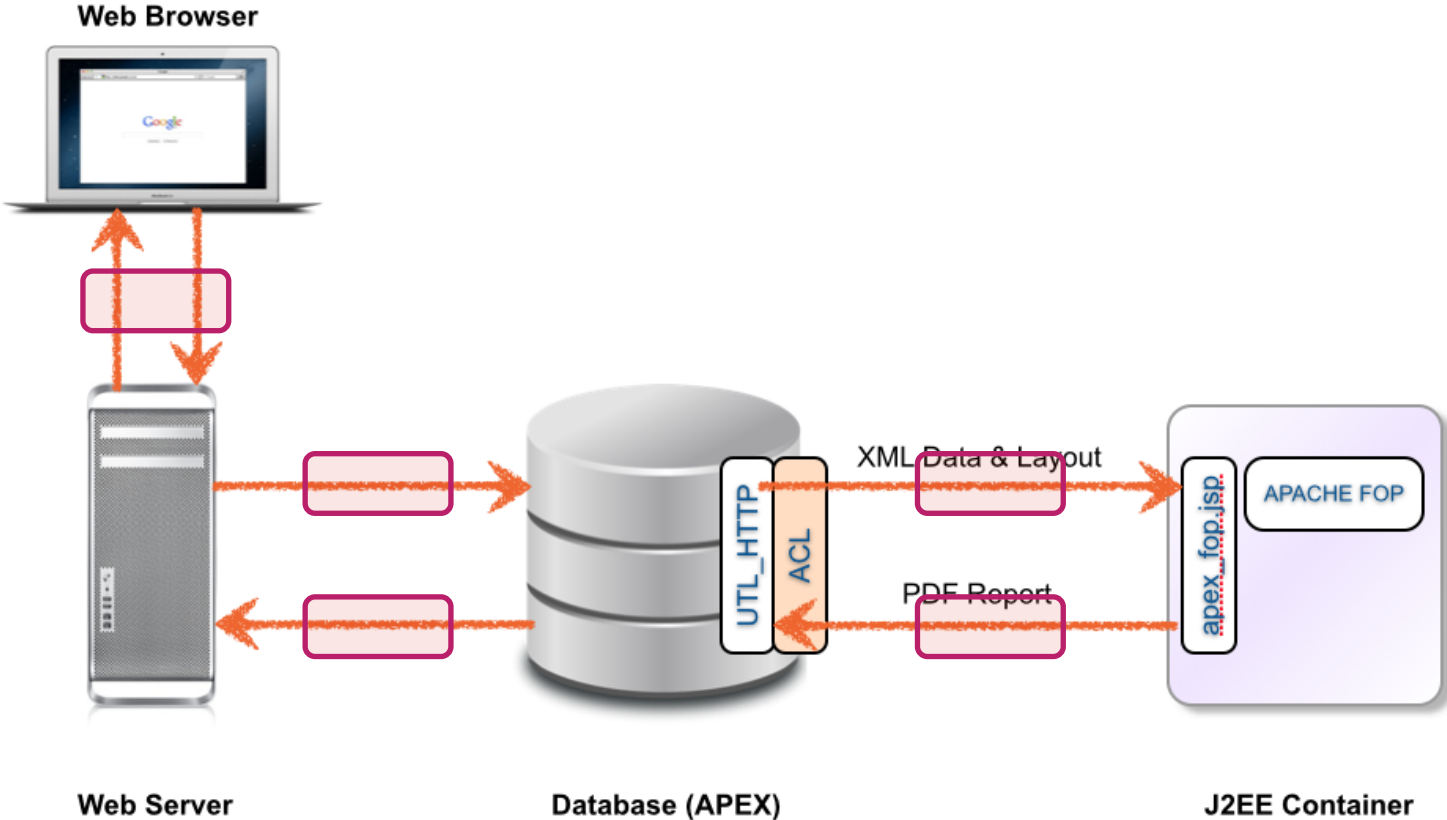
## 2. APEX Print Engine FOP

- ▶ **XSL - Formatting Objects**
  - Markup Language for XML documents
  - Requires an XSL-FO Processor to generate the final doc
- ▶ Oracle APEX uses Apache FOP (1.0), ships the file `fop.war` to be deployed in an OC4J J2EE server.
- ▶ Basically what we need at runtime are two xml files:
  - The data
  - The layout

# Integration Strategies for APEX

## 2. APEX Print Engine FOP

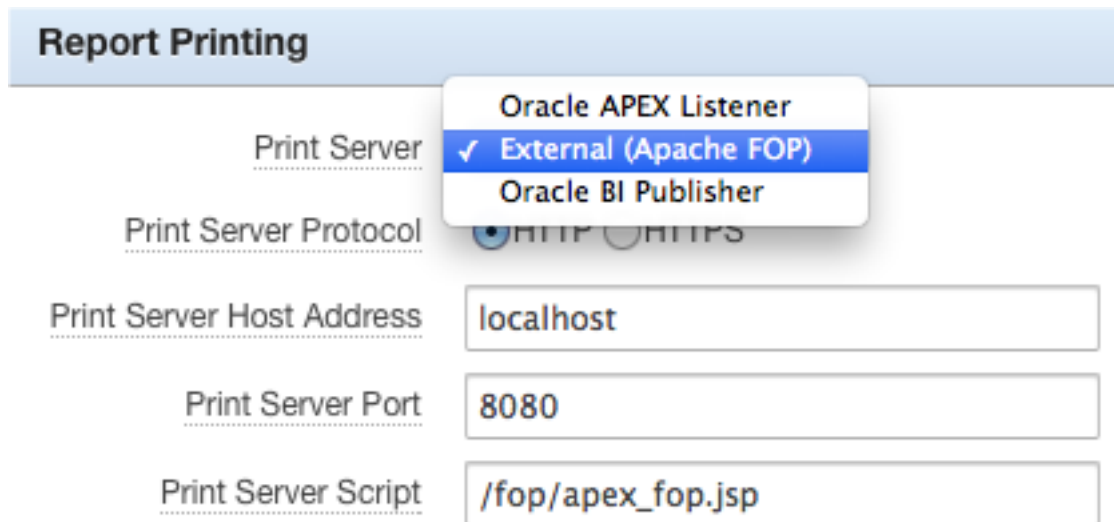
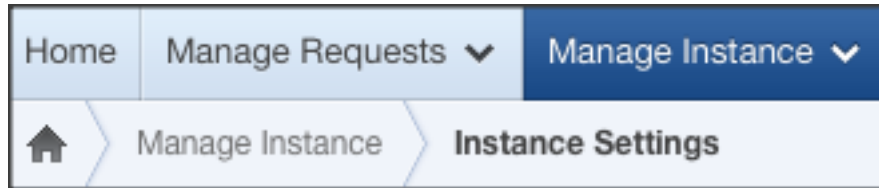
### ► The Architecture



# Integration Strategies for APEX

## 2. APEX Print Engine FOP


► Setup in the Internal Administration:



# Integration Strategies for APEX

## 2. APEX Print Engine FOP


### ► Interactive Reports:




**Download**  
 Choose report download format:

Order #	Customer Name	Sales Rep	Order Total	Order Date	Order Month
0010	Bradley, Eugene	DEMO	\$870.00	19-MAR-14	March 2014
0009	Hartsfield, William	DEMO	\$730.00	16-MAR-14	March 2014
0008	OHare, Frank	DIETMAR.AUST	\$1,060.00	10-MAR-14	March 2014
0007	Logan, Edward	DEMO	\$905.00	02-MAR-14	March 2014

 Order Month is in the last 1 months  

Order # 	Customer Name	Sales Rep	Order Total	Order Date	Order Month
0010	Bradley, Eugene	DEMO	\$870.00	19-MAR-14	March 2014
0009	Hartsfield, William	DEMO	\$730.00	16-MAR-14	March 2014
0008	OHare, Frank	DIETMAR.AUST	\$1,060.00	10-MAR-14	March 2014
0007	Logan, Edward	DEMO	\$905.00	02-MAR-14	March 2014



# Integration Strategies for APEX

## 2. APEX Print Engine FOP

- ▶ The basic integration uses Generic Columns

### Report Layout Type:

- Generic Columns (XSL-FO)
- Named Columns (XSL-FO)

- ▶ Each column is formatted in the same way
- ▶ Basic formatting in the print section for classic reports:

### Report Columns

Font:  Font Weight:  Font Size:

Font Color:  Background:

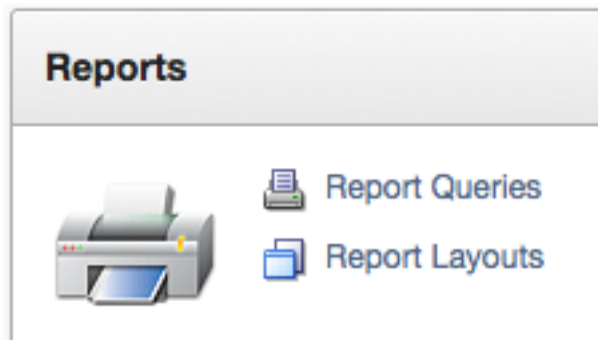
Total Width:  Column Width Units:

Alias	Heading	Show in Report	Include in Export	Column Width
ORDER_ID	Order ID	Yes	<input type="checkbox"/>	<input type="text" value="0"/>
ORDER_NUMBER	Order #	Yes	<input checked="" type="checkbox"/>	<input type="text" value="20"/>
CUSTOMER_NAME	Customer Name	Yes	<input checked="" type="checkbox"/>	<input type="text" value="20"/>
SALES_REP	Sales Rep	Yes	<input checked="" type="checkbox"/>	<input type="text" value="20"/>
ORDER_ITEMS	Order Items	Yes	<input checked="" type="checkbox"/>	<input type="text" value="20"/>
ORDER_TOTAL	Order Total	Yes	<input checked="" type="checkbox"/>	<input type="text" value="20"/>
TAGS	Tags	Yes	<input type="checkbox"/>	<input type="text" value="0"/>
ORDER_DATE	Order Date	Yes	<input type="checkbox"/>	<input type="text" value="0"/>
ORDER_MONTH	Order Month	Yes	<input type="checkbox"/>	<input type="text" value="0"/>

# Integration Strategies for APEX

## 2. APEX Print Engine FOP

- ▶ You can also use Named Columns Templates
- ▶ Step 1: get the XML either from an existing report or from a defined report query
- ▶ Step 2: Design the layout based on the sample XML file
- ▶ Step 3: Upload the XSL-FO file to Shared Components > Reports > Report Layouts





# Integration Strategies for APEX

## 2. APEX Print Engine FOP

### ▶ Demo: Classic report with named columns layout

1. Get XML data from classic report
2. Upload named columns layout
3. Use classic report with named columns layout



### ▶ Demo: Using report query and layout together

1. Get XML data from report query
2. Upload named columns layout
3. Assign layout to query
4. Create button for calling the report



# Integration Strategies for APEX

## 2. APEX Print Engine FOP

### ► Using the API APEX\_UTIL.GET\_PRINT\_DOCUMENT

```
DECLARE
    l_id number;
    l_document BLOB;
BEGIN
    l_document := APEX_UTIL.GET_PRINT_DOCUMENT (
        p_report_data      => :P1_XML,
        p_report_layout    => :P1_XSL,
        p_report_layout_type => 'xsl-fo',
        p_document_format  => 'pdf');

    l_id := APEX_MAIL.SEND(
        p_to      => :P35_MAIL_TO,
        p_from    => 'noreplies@oracle.com',
        p_subj    => 'sending PDF via print API',
        p_body    => 'Please review the attachment.',
        p_body_html => 'Please review the attachment');

    APEX_MAIL.ADD_ATTACHMENT (
        p_mail_id  => l_id,
        p_attachment => l_document,
        p_filename => 'mydocument.pdf',
        p_mime_type => 'application/pdf');
END;
```

- 4 different function signatures available
- Generates BLOB
- Need to generate the report data yourself for use with dbms\_scheduler, no APEX context here

# Integration Strategies for APEX

## 2. APEX Print Engine FOP

- ▶ Complete step-by-step example from Marc Sewtz:  
<http://marcsewtz.blogspot.de/2013/04/pdf-printing-with-oracle-application.html>
- ▶ XSL-FO WYSIWYG Design Tools
- ▶ ALTOVA StyleVision Enterprise (\$629)
  - MS-Windows Only

# Integration Strategies for APEX

Altova StyleVision - [orders.sps \* / Orders.xml]

File Edit Project View Insert Enclose with Table Authentic Database Properties Tools Window Help

Normal Verdana 14

Project

- combo boxes.sps
- conditions.sps
- DB.sps
- DBSample.sps

Design Overview

Sources

- \$XML (main)
- Schema Orders...
- Working XML Orders.xml
- Template XML
- XML Signature Disabled

Modules

- add new Module...

CSS Files

- add new CSS File...

Parameters

Schema Tree

- DOCUMENT
  - DATE
  - USER\_NAME
  - APP\_ID
  - APP\_NAME
  - PAGE\_ID
  - TITLE
  - REGION
    - ID
  - ROWSET

Initial Document Section

OPAL Consulting

This is an overview of the top customer orders ...

(content)

Order #	Customer Name	Sales Rep	#Items	Order Total	Order Date	Order Month
(content)	(content)	(content)	(content)	(content)	(content)	(content)

Styles

Styles For: No styles available

1 line

Style Repository Styles

Properties

Properties For: line

Attribute	Value
line	
Authentic	
user info	
common	
class	
dir	
id	
lang	
title	
event	

Design Authentic eForm HTML RTF PDF Word 2007+

orders.sps \*

StyleVision Enterprise Edition v2014 rel. 2 Registered to Dietmar Aust (opal-consulting) ©1998-2014 Altova GmbH

CAP NUM SCRL

# Integration Strategies for APEX

The screenshot displays the Altova StyleVision interface. The main window shows a PDF report generated from an XSLT transformation. The report features the OPAL Consulting logo and the title "This is an overview of the top customer orders ...". Below the title is a table of customer orders for the region DIETMAR.AUST.

Order #	Customer Name	Sales Rep	#Items	Order Total	Order Date	Order Month
0002	Dulles, John	DEMO	10	€2.380,00	28.01.14	Januar 2014
0003	Hartsfield, William	DEMO	5	€1.640,00	08.02.14	Februar 2014
0009	Hartsfield, William	DEMO	3	€730,00	16.03.14	März 2014
0006	Logan, Edward	DEMO	4	€1.515,00	25.02.14	Februar 2014
0007	Logan, Edward	DEMO	7	€905,00	02.03.14	März 2014
0008	OHare, Frank	DEMO	4	€1.060,00	10.03.14	März 2014
0004	LaGuardia, Fiorello	DEMO	5	€1.090,00	10.02.14	Februar 2014
0005	Lambert, Albert	DEMO	5	€950,00	20.02.14	Februar 2014
0001	Bradley, Eugene	DEMO	3	€1.890,00	14.01.14	Januar 2014
0010	Bradley, Eugene	DEMO	3	€870,00	19.03.14	März 2014

The interface also shows a Project pane on the left with files like 'combo boxes.sps', 'conditions.sps', 'DB.sps', and 'DBSample.sps'. The Design Overview pane shows the Sources, Modules, CSS Files, Parameters, and XSLT Files. The Schema Tree pane shows the XML structure. The bottom status bar indicates 'StyleVision Enterprise Edition v2014 rel. 2 Registered to Dietmar Aust (opal-consulting) ©1998-2014 Altova GmbH'.

# Integration Strategies for APEX

## 2. APEX Print Engine FOP

### ▶ StylusStudio (\$695)

- MS-Windows Only

### ▶ Java4Less FO-Designer (\$124.60)

- <http://www.java4less.com/fopdesigner/fodesigner.php>
- Cross Platform (MAC, Linux, Windows, ...)
- Special focus on Oracle APEX, step by step instructions
- Gets you up and running quickly
- Windows installer for their own **J4L FOP print server** (optional) , uses Jetty J2EE Server and works immediately
- Cheap in comparison
- Designer somewhat limited but works in real world projects

# Integration Strategies for APEX

## 2. APEX Print Engine FOP

The screenshot displays the Oracle APEX FO Designer interface for a report titled "APEXOrder - Page master 1". The interface includes a menu bar (File, Objects, Areas, Masters, Administration, Help), a toolbar, and a main design canvas. On the left, a tree view shows the report structure:

- DOCUMENT
  - DATE
  - USER NAME
  - APP ID
  - APP NAME
  - TITLE
  - P29 ORDER ID
  - REGION
    - ID
  - ROWSET1
    - ROWSET1 ROW
      - ORDER ID
      - CUSTOMER ID
      - ORDER TOTAL
      - ORDER TIMESTAMP
      - CUST FIRST NAME
      - CUST LAST NAME
      - CUST STREET ADDRESS1
      - CUST CITY
      - CUST EMAIL
  - ROWSET2
    - ROWSET2 ROW
      - ORDER ID
      - PRODUCT ID
      - UNIT PRICE
      - QUANTITY
      - PRODUCT NAME

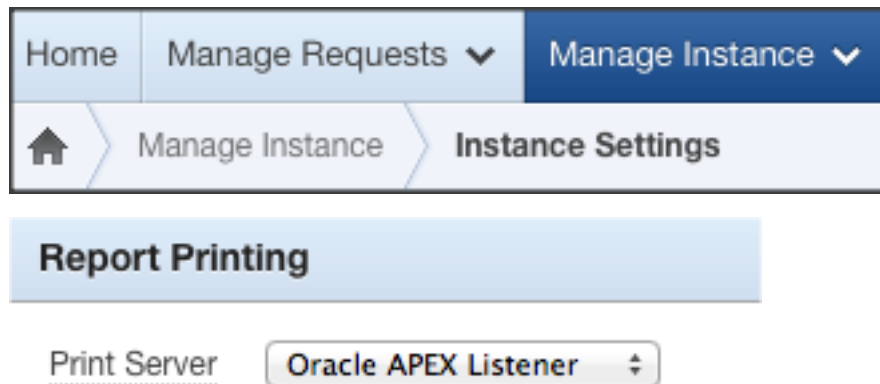
The main design canvas shows a grid layout with the following sections:

- Header - /DOCUMENT/REGION/ROWSET1/ROWSET1\_ROW**: Contains fields for Customer (CustName, CUST\_EMAIL, Street, City).
- Page Header**: Includes the ODTUG logo, Order Number (ORDER\_ID), and Order Date (ORDER\_TIMESTAMP).
- Detail columns header**: A table header with columns: Product Id, Name / Description, Quantity, Price, Amount.
- Detail - /DOCUMENT/REGION/ROWSET2/ROWSET2\_ROW**: A table row with columns: ProductId, ProductName, quantity, price, Mult, and ProductDesc.
- Footer - /DOCUMENT/REGION/ROWSET1/ROWSET1\_ROW**: Contains a Total field.
- Page Footer**: A thank you message: "Thank you for ordering with ODTUG. Please visit us at www.odtug.com".

# Integration Strategies for APEX

## 2a. APEX Print Engine FOP (internal with APEX Listener)

- ▶ APEX LISTENER 2.0+ & APEX 4.2.2+
  - Includes FOP support
  - No extra J2EE container necessary
- ▶ Needs to be configured in internal administration



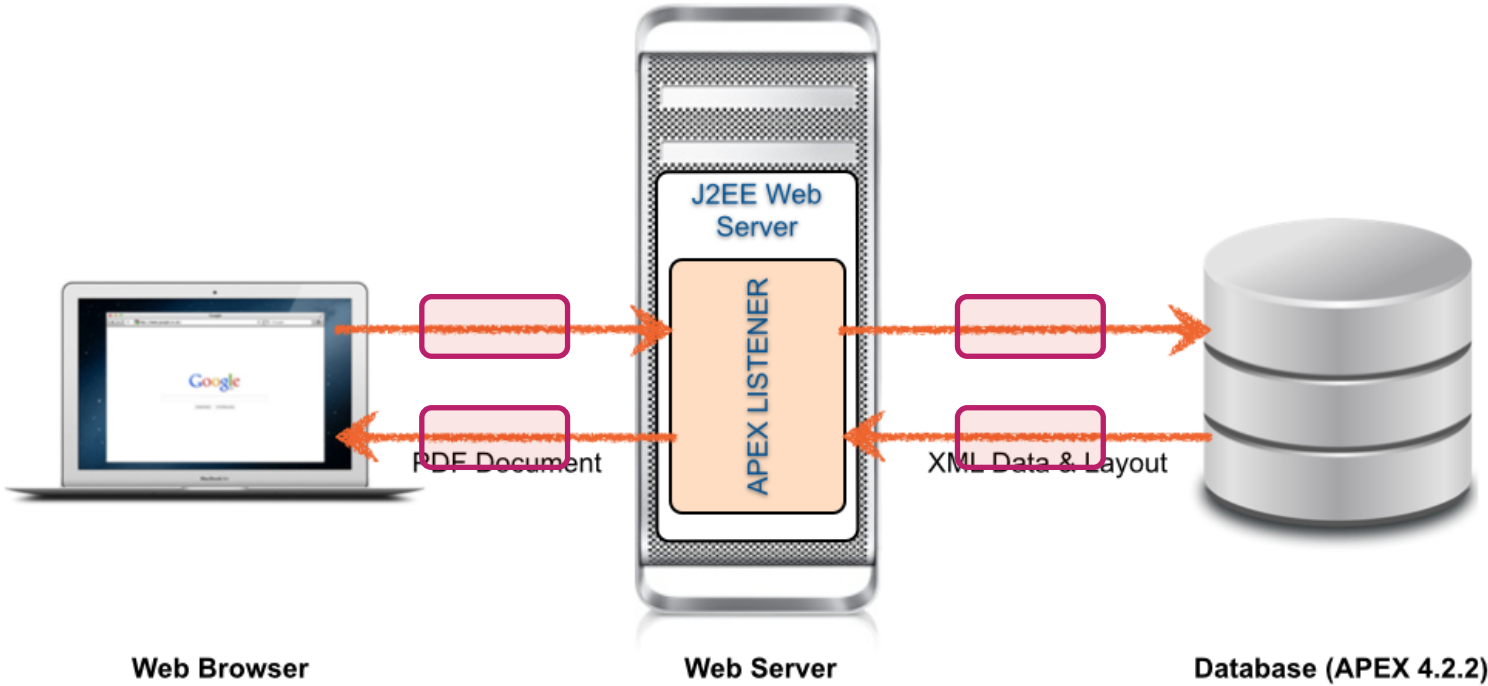
- ▶ Does not work with `APEX_UTIL.GET_PRINT_DOCUMENT` API



# Integration Strategies for APEX

## 2a. APEX Print Engine FOP (internal with APEX Listener)

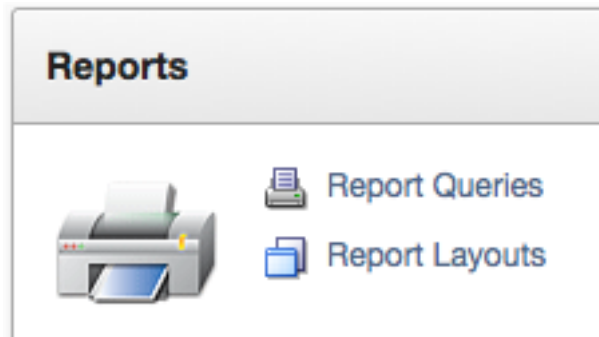
### ► Architecture



# Integration Strategies for APEX

## 3. APEX Print Engine BI Publisher

- ▶ Oracle BI Publisher
- ▶ Powerful, complete reporting solution
- ▶ Step 1: get the XML either from an existing report or from a defined report query
- ▶ Step 2: Design the layout based on the sample XML file using MS Word and the BI Publisher Plugin
- ▶ Step 3: Upload the RTF template to Shared Components > Reports



# Integration Strategies for APEX

## 3. APEX Print Engine BI Publisher

- ➕ Additional formats: MS Word, MS Excel
- ➕ Handles all the use cases pretty well
- ➕ You can leverage existing templates in MS Word but also easily produce other output formats like PDF or MS Excel
- ➖ Too expensive for most projects

# Integration Strategies for APEX

## 4. PL/SQL based generation – PL/PDF

- ▶ PL/PDF (<http://www.plpdf.com/>)
- ▶ Provides a set of PL/SQL based APIs to generate PDF files from the Oracle database
- ▶ License cost: 600\$ per Oracle instance
- ▶ A simple example:

```
plpdf.init;  
plpdf.NewPage;  
plpdf.SetPrintFont('Arial',NULL,12);  
plpdf.PrintCell(50,10,'Hello World');  
plpdf.SendDoc(l_blob);
```

# Integration Strategies for APEX

## 4. PL/SQL based generation – PL/PDF

➖ No GUI for designing the report, everything needs to be coded

➕ Interesting features for manipulating PDFs

- **PDF Encryption/Decryption (40/128 bit RC4, AES and Public Key)**
- PDF Metadata manipulation
- Extraction of text from PDF
- **Merging PDF documents (2, 10 or unlimited)**
- Replacement of URLs in a PDF document
- Stamp content or watermark into a PDF document (JPG/Text)
- Export and Import PDF form data (FDF and XFDF)
- **Extract pages to a new PDF**
- Get number of pages
- Compress JPG images in PDF
- **add Digital Signature to PDF**

# Integration Strategies for APEX

## 4. External Reporting Engine: JasperReports

- ▶ JasperReports <http://sourceforge.net/projects/jasperreports/>
- ▶ What is it?
  - Java library (jar file), can be embedded into any java application (e.g. SWING, RCP, J2EE, on the command line using ANT or just a plain Java Runtime)
  - It ships with other Open Source libraries like iText, Groovy, Hibernate, JFreeChart, Log4J, POI, etc.
  - Community and professional editions
- ▶ License: GNU Lesser General Public License version 3 (LGPLv3)

# Integration Strategies for APEX

## 4. External Reporting Engine: JasperReports

### ► Features:

- **JasperReports provides a comprehensive feature set**
- Data sources: JDBC, XML, OLAP, TEXT, Hadoop ..., and extensibility through custom data sources, multiple data sources per report
- Output formats: pdf, xls, xlsx, html, xhtml, csv, text, rtf, odf, docx, pptx, ..
- Matrix reports
- Charts (Jfreechart)
- Report trigger
- Subreports / modularization / reusability
- Conditional formatting (styles)
- Conditional rendering of elements
- Scripting languages, especially for conditions and calculations: Java, Groovy, Javascript
- Fonts, Unicode, NLS
- ...

### ► Visual report layout with the iReport designer

# Integration Strategies for APEX

## 4. External Reporting Engine: JasperReports

The screenshot displays the JasperReports Studio environment. The central workspace shows a report design for an order form and a table. The report includes the OPAL Consulting logo, a title 'Order', and a 'Customer' section. Below this is a table with columns for Product #, Product, Quantity, Unit Price, and Amount. The table contains one row of data with placeholders for product and amount values. The report footer includes a page number and a date placeholder.

The left sidebar shows the Outline view with a tree structure of report elements: Styles, Parameters, and Fields. The Fields list includes: PRODUCT\_ID, PRODUCT\_NAME, PRODUCT\_DESCRIPTION, QUANTITY, UNIT\_PRICE, AMOUNT, CUSTOMER\_ID, CUST\_FIRST\_NAME, CUST\_LAST\_NAME, CUST\_STREET\_ADDRESS1, CUST\_STREET\_ADDRESS2, CUST\_CITY, CUST\_STATE, CUST\_POSTAL\_CODE, CUST\_EMAIL, ORDER\_ID, ORDER\_TOTAL, and ORDER\_TIMESTAMP.

The right sidebar shows the Properties view for the 'AMOUNT' field, with the Name set to 'AMOUNT' and the Class set to 'java.math.BigDecimal'. The bottom status bar indicates 'Preview: crosstab\_daterow on'.



# Integration Strategies for APEX

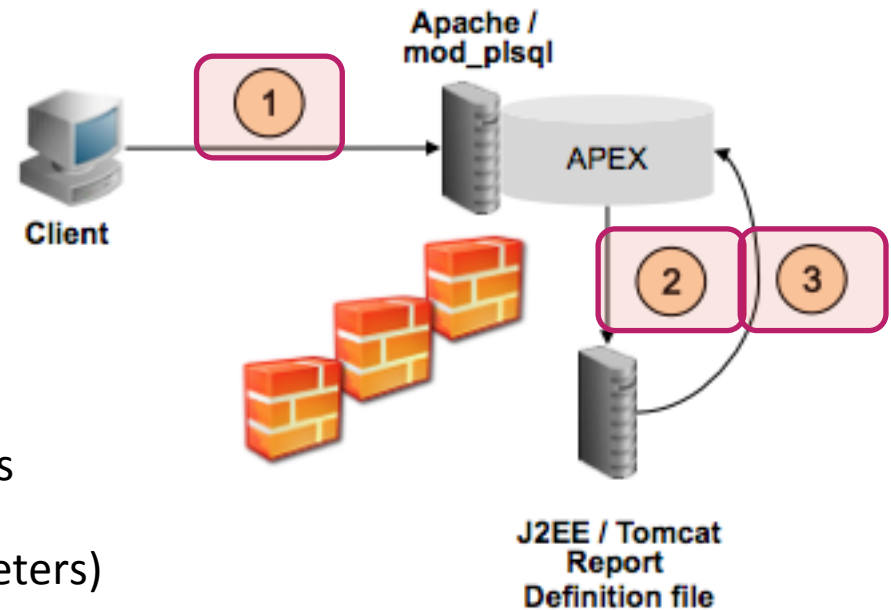
## 4. External Reporting Engine: JasperReports

### ► Integration with APEX

► 1: Client clicks on a link

► 2: APEX calls the JasperIntegration in the J2EE Server (Tomcat) and passes just the parameters (report\_name, connect information, report parameters)

► 3: JasperReports starts a database connection and generates the report

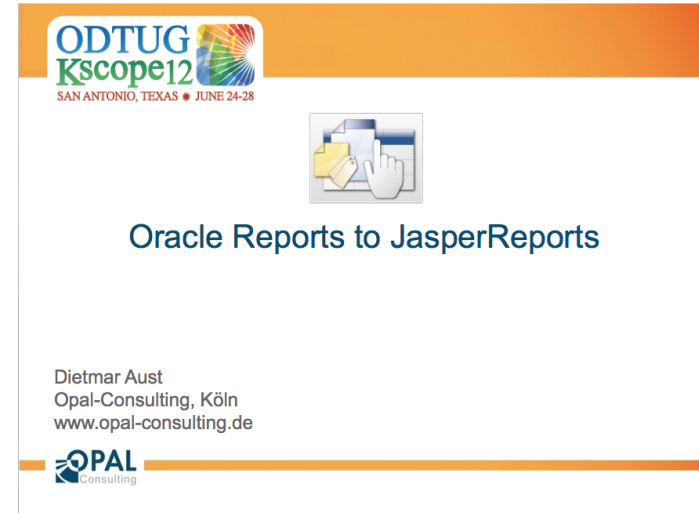


# Integration Strategies for APEX


## 4. External Reporting Engine: JasperReports

- ▶ Integration Kit available:  
<http://www.opal-consulting.de/tools>
- ▶ License: BSD – do whatever you like but don't sue me
- ▶ Indepth analysis of use cases for moving from Oracle Reports to JasperReports at KScope 2012
- ▶ Step by step integration into the sample application:

[http://www.opal-consulting.de/downloads/free\\_tools/JasperReportsIntegration/Opal-Consulting-JasperReportsIntegration.pdf](http://www.opal-consulting.de/downloads/free_tools/JasperReportsIntegration/Opal-Consulting-JasperReportsIntegration.pdf)

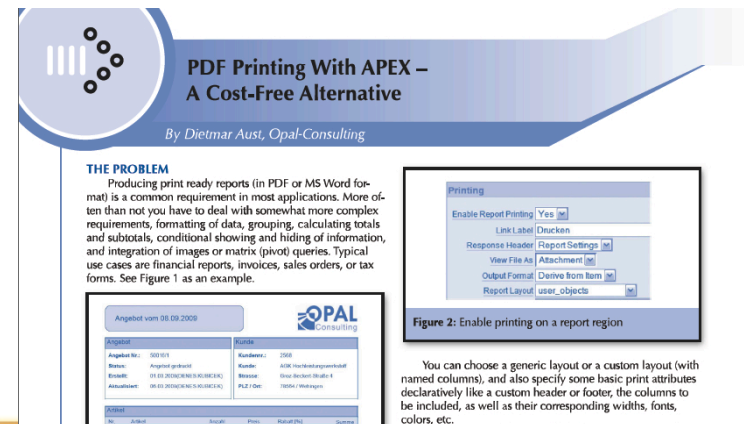



ODTUG Kscope12  
SAN ANTONIO, TEXAS • JUNE 24-28



### Oracle Reports to JasperReports

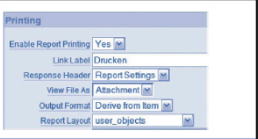
Dietmar Aust  
Opal-Consulting, Köln  
[www.opal-consulting.de](http://www.opal-consulting.de)



### PDF Printing With APEX – A Cost-Free Alternative


By Dietmar Aust, Opal-Consulting

**THE PROBLEM**  
Producing print ready reports (in PDF or MS Word format) is a common requirement in most applications. More often than not you have to deal with somewhat more complex requirements, formatting of data, grouping, calculating totals and subtotals, conditional showing and hiding of information, and integration of images or matrix (pivot) queries. Typical use cases are financial reports, invoices, sales orders, or tax forms. See Figure 1 as an example.



**Figure 2: Enable printing on a report region**

You can choose a generic layout or a custom layout (with named columns), and also specify some basic print attributes declaratively like a custom header or footer, the columns to be included, as well as their corresponding widths, fonts, colors, etc.



Angebot vom 08.09.2009					
<b>Angebot</b>	<b>Kunde</b>				
Angebot Nr.: 000001	Kundenr.: 0000				
Bezeichnung: Angebot gebäude	Abteilung: 4000 - Herkennungsgruppen				
Erstellt: 01.09.2009 09:00:00 (UTC+02:00)	Erstellt von: 08.09.09				
Aktualisiert: 08.09.2009 09:00:00 (UTC+02:00)	PLZ-Ort: 70504 - Weingarten				
<b>Ordnung</b>					
Nr.	Abtrah.	Brutto	Preis	Netto (2%)	Steuer

# Integration Strategies for APEX

## 5. External Reporting Engine: Other Engines

- ▶ Conceptionally expose reporting functionality using an URL based interface which passes parameters and just triggers the execution of a report somewhere else, then returns the generated document.
- ▶ Integration typically uses `UTL_HTTP` or `APEX_WEB_SERVICE`
- ▶ Thus, all kinds of engines can be used:
  - Oracle Reports, Chrystal Reports, Eclipse BIRT
  - Business Objects
  - ...
- ▶ Powerful engines, perhaps already installed in your corporation
- ▶ You have to deal with security, though. SSO might be challenging but there are simple workarounds.

# Integration Strategies for APEX

## 4. PL/SQL based generation – PL-jrxml2pdf

- ▶ PL-jrxml2pdf <http://sourceforge.net/projects/pljrxml2pdf/>
- ▶ Open Source project developed by Andreas Weiden
- ▶ License: MIT
- ▶ The concept
  - Design your report layout using the iReport Designer / Jaspersoft Studio
  - Use a pure PL/SQL based runtime engine based on the package AS\_PDF3 written by Anton Scheffer to process the .jrxml definition file
- ⊕ Use a GUI tool design your reports (live jdbc connection and preview)
- ⊕ Deploy it in a pure PL/SQL environment
- ⊖ Does not support all of the JasperReports features, but very many
- ⊕ Can always move the definitions to a „real“ , java based runtime

# Integration Strategies for APEX

## 4. PL/SQL based generation – PL-jrxml2pdf

### ► Features

- Text styling, conditional styling, frames, borders, colors
- Conditional rendering, basic Java operators (+,-,=,>, AND, OR, NOT, IS NULL, ...) are translated to pl/sql
- Report tables
- Crosstabs
- Subreports
- Groups
- Custom Fonts
- Images
- NLS-support, also translations using Resource Files
- Charts
- Generating a single PDF from multiple report definitions
- HTML field support (basic)
- Google Map Images
- **JRXML-Generator for quickly creating a basic report definition file from an APEX page**

# Integration Strategies for APEX

## 6. MS Word Templating using Doxy

### ► Doxy by iAdvise ( <http://www.doxy.eu/> )

The screenshot shows the Doxy website homepage. At the top, there is a navigation menu with links for Home, Product, Architecture, Demo, Support, and Contact Us. Below the menu, the text "Simplify with Doxy" is displayed in pink. To the right of this text are two buttons: "Try Doxy" and "Buy Doxy". The main content area features a diagram illustrating the Doxy workflow. On the left, there is a .docx file icon with the text "Create a document in your word processor. This can be done by your IT department, or by a business user...". In the center, there is a plus sign followed by an Oracle Database icon with the text "Write a query to get the data from your database...". To the right of the plus sign is an equals sign, followed by a document icon with the text "Doxy creates your desired output".

### ► The concept

- Take an existing MS Word (docx) document and put placeholders in it
- Pure PL/SQL based solution (the PDF converter uses an a Java callout to the OS to call Aspose.PDF / embedded license included)
- At runtime parses the docx xml structures and replaces the variables

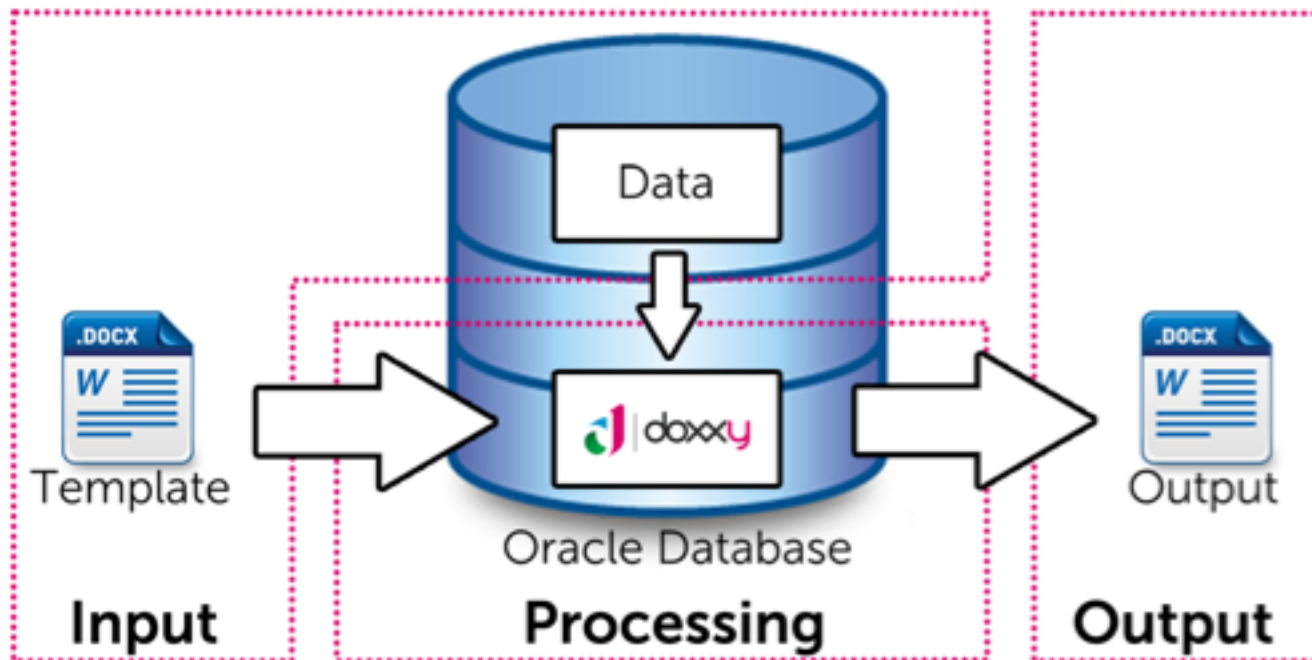
### ► License: 1500€ per database (docx only)

2000€ (docx + pdf), uses an external process on the DB host (Aspose.PDF)

# Integration Strategies for APEX

## 6. MS Word Templating using Doxy

### Simple Architecture



# Integration Strategies for APEX

## 6. MS Word Templating using Doxy



DEMO

**Folders** + Create Folder

- CVAPP
  - CV
    - SQL Statements
    - PL/SQL Statements
    - Templates
    - Parameters
- DOCUFY
  - DEMO
    - Order Confirmation
      - SQL Statements
        - Orders
          - Customers
          - Items**
          - Product available
      - PL/SQL Statements
      - Templates
      - Parameters
  - SYSTEM
    - Document Meta Data Fiche
    - System Info

Home > DOCUFY > DEMO > Order Confirmation > Orders > Items

Items - Edit SQL Info Cancel Save Changes

**Statement**

Parent SQL Statement [?]   
 Orders

\* SQL Statement [?]

```

1 SELECT p.product_name,
2        p.product_description,
3        TRIM(TO_CHAR(i.unit_price, '999G999D00'))
4        unit_price,
5        i.quantity,
6        TRIM(TO_CHAR(i.unit_price * i.quantity,
7 '999G999D00')) total_price,
8        DECODE(p.product_avail, 'Y', 1, 0) product_avail,
9        bl$dg4o_interface.img(p.product_image,2,2) photo,
10       SIGN(NVL(dbms_lob.getlength(p.product_image), 0))
11       check_photo
12       FROM demo_order_items i,
13       demo_product_info p
14       WHERE i.product_id = p.product_id
15             AND i.order_id = :ORDER_ID
16       ORDER BY p.product_name
    
```

Parse SQL Copy from SQL

\* Usage In Document \* Recordset Code \* Document Area

List	ITEMS_LIST	Body of a document
Table	ITEMS_TABLE	Body of a document

+ Add

**Link Variables**

✓ ORDER_ID	#123
ORDER_TIMESTAMP_EN	ABC
ORDER_TIMESTAMP_NL	ABC
ORDER_TOTAL	ABC

**Parameters** + Create

P_ORDER_ID	#123	
------------	------	--





# Integration Strategies for APEX

## 6. MS Word Templating using Doxy

[BEGIN:ORDERS][BEGIN:CUSTOMERS]

**iAdvise**

**ORDER CONFIRMATION**

[CUST\_NAME]  
[CUST\_STREET]  
[CUST\_CITY]

Your reference number: [ORDER\_ID]

Kontich, [ORDER\_TIMESTAMP\_EN]

Dear [CUST\_FIRST\_NAME],


Thank you for shopping at iAdvise. We have following products reserved for you:

– [BEGIN:ITEMS\_LIST][PRODUCT\_NAME] (€[TOTAL\_PRICE])[END:ITEMS\_LIST]

The total amount of your order is €[ORDER\_TOTAL].

# Integration Strategies for APEX

## 6. MS Word Templating using Doxy

Product	Description	Image	Unit Price in €	Quantity	Extended Price in €
[BEGIN:ITEMS_TABLE][IF:PRODUCT_AVAILABLE][PRODUCT_NAME][ELSE:PRODUCT_AVAILABLE][PRODUCT_NAME] (*)[ENDIF:PRODUCT_AVAILABLE]	[IF:PRODUCT_AVAILABLE][PRODUCT_DESCRIPTION][ELSE:PRODUCT_AVAILABLE][PRODUCT_DESCRIPTION][ENDIF:PRODUCT_AVAILABLE]	[IF:CHECK_PHOTO] [IMG:photo] [ELSE:CHECK_PHOTO]   [ENDIF:CHECK_PHOTO]	[IF:PRODUCT_AVAILABLE][UNIT_PRICE][ELSE:PRODUCT_AVAILABLE][UNIT_PRICE][ENDIF:PRODUCT_AVAILABLE]	[IF:PRODUCT_AVAILABLE][QUANTITY][ELSE:PRODUCT_AVAILABLE][QUANTITY][ENDIF:PRODUCT_AVAILABLE]	[IF:PRODUCT_AVAILABLE][TOTAL_PRICE][ELSE:PRODUCT_AVAILABLE][TOTAL_PRICE][ENDIF:PRODUCT_AVAILABLE][END:ITEMS_TABLE]

[ORDER\_TOTAL]

[BEGIN:PRODUCT\_AVAILABLE][IF:CHECK\_PRODUCT\_AVAILABLE] (\*) This product is currently not in stock, your order may be delayed. [ELSE:CHECK\_PRODUCT\_AVAILABLE][ENDIF:CHECK\_PRODUCT\_AVAILABLE][END:PRODUCT\_AVAILABLE][END:ORDERS]

# Integration Strategies for APEX

## 6. MS Word Templating using Doxy

**iAdvise**

**ORDER CONFIRMATION**

John Dulles  
45020 Aviation Drive  
Sterling, VA 20166

Your reference number: 2

Kontich, 23 august 2013




Dear John,

Thank you for shopping at iAdvise. We have following products reserved for you:

- Bag (€500.00)
- Belt (€60.00)
- Blouse (€180.00)
- Business Shirt (€150.00)
- Jacket (€450.00)
- Ladies Shoes (€240.00)
- Mens Shoes (€220.00)
- Skirt (€240.00)
- Wallet (€100.00)

# Integration Strategies for APEX

## 6. MS Word Templating using Doxy

Product	Description	Image	Unit Price in €	Quantity	Extended Price in €
Business Shirt	Wrinkle-free cotton business shirt		50.00	3	150.00
Jacket (*)	Fully lined jacket which is both professional and extremely comfortable to wear		150.00	3	450.00
Wallet	Travel wallet suitable for men and women. Several compartments for credit cards, passports and cash		50.00	2	100.00

**2,140.00**

(\*) This product is currently not in stock, your order may be delayed.

# Integration Strategies for APEX

## 4. PL/SQL based generation – PL-jrxml2pdf

- ⊕ Use a familiar GUI environment => MS Word
- ⊕ Runs in a pure PL/SQL environment
- ⊕ Generates a „true“ MS Word document
- ⊖ Cannot handle complex reporting requirements

# Data Export

# Data Export

## Export with proper data types

Customer	Period	Registration	Amount	Ident	Street	Street No	City	Zip	Country
Dietmar Aust	01/2012	01.01.12	€10.000,11	0123456789011111	Zum Tilmeshof	11	Köln	50859	Deutschland
Manfred Mustermann	01/2012	01.01.13	€5.000,11	01234567890a	Zum Tilmeshof	11a	Dresden	01067	Deutschland
Manfred Mustermann	01/2012	01.01.13	€5.000,11	0123456789022222222	Am Markt	3500	Leipzig	04178	Deutschland
Manfred Mustermann	01/2012	01.01.13	€5.000,11	012345678901a	Karlsruher Allee	99b	Halle (Saale)	06132	Deutschland
Manfred Mustermann	01/2012	01.01.13	€5.000,11	01234567890	Am Markt	3500	Leipzig	04178	Deutschland

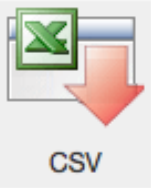
	A	B	C	D	E	F	G	H	I	J
1	Customer	Period	Registration	Amount	Ident	Street	Street No	City	Zip	Country
2	Dietmar Aust	Jan 12	01.01.12	€ 10.000,11	1,23457E+14	Zum Tilmesh	11	Köln	50859	Deutschland
3	Manfred Mu	Jan 12	01.01.13	€ 5.000,11	01234567890a	Zum Tilmesh	11a	Dresden	1067	Deutschland
4	Manfred Mu	Jan 12	01.01.13	€ 5.000,11	1,23457E+18	Am Markt	3500	Leipzig	4178	Deutschland
5	Manfred Mu	Jan 12	01.01.13	€ 5.000,11	012345678901a	Karlsruher Al	99b	Halle (Saale)	6132	Deutschland
6	Manfred Mu	Jan 12	01.01.13	€ 5.000,11	1234567890	Am Markt	3500	Leipzig	4178	Deutschland

► **Excel interprets and modifies the data automatically!**

- Street No. is interpreted either as text or number (11, 11a)
- Zip-code: 01067 is converted to number 1067 leading zeroes are lost!!!
- Ident-Codes > 12 digits => converts to scientific notation (E+18)

# Data Export

## Export with proper data types



### ► Regular APEX Export to CSV when using Interactive Reports

- Workaround to properly display leading zeroes in the CSV export
- => Force data type text (e.g. for 04178 format as formula: `= "04178"`)

```
select    country
         , ident
         , customer
         , customer_registered_on
         , customer_period
         , sum_of_purchases
         , street
         , street_no
         , city
         , decode(:request, 'CSV', '="' || zip || '"', zip) zip
from      jdd_csv_demo
```



# Data Export

## Export with proper data types

- ▶ Workaround does not work for interactive reports! => CSV is empty!

Filter: Zip = '04178'

Customer	Period	Registration	Amount	Ident	Street	Street No	City	Zip	Country
Manfred Mustermann	01/2012	01.01.13	€5.000,11	01234567890222222222	Am Markt	3500	Leipzig	04178	Deutschland
Manfred Mustermann	01/2012	01.01.13	€5.000,11	01234567890	Am Markt	3500	Leipzig	04178	Deutschland

1 - 2

```

select "CUSTOMER", "CUSTOMER_PERIOD", "CUSTOMER_REGISTERED_ON" , "SUM_OF_PURCHASES",
"IDENT",
"STREET", "STREET_NO" , "CITY", "ZIP", "COUNTRY", count(*) over () as apxws_row_cnt
from
(select *
from
(select country , ident , customer , customer_registered_on , customer_period ,
sum_of_purchases , street , street_no , city , decode(:request, 'CSV', '='||zip||'',
zip) zip
from jdd_csv_demo
) r
where("ZIP" = :APXWS_EXPR_1)
) r
where rownum <= to_number(:APXWS_MAX_ROW_CNT);

```

04178 ≠ "04178"

# Data Export

## Export with proper data types

- ▶ Manual export to CSV with stored procedure
  - <http://spendolini.blogspot.de/2006/04/custom-export-to-csv.html>
  - <http://www.astral-consultancy.co.uk/cgi-bin/hunbug/doco.cgi?11270>
- ▶ Manual export to HTML with stored procedure, set Mime-Type=MS Excel
  - <http://roelhartman.blogspot.de/2006/07/how-to-create-neatly-formatted-excel.html>

	A	B	C	D	E
1	EMPLOYEE INFO				
2					
3	Test				
4	Customer	Period	Ident	Street No	ZIP
5	Dietmar Aust	01.01.12	1,23457E+14	11	50859
6	Manfred Mustermann	01.01.12	01234567890a	11a	1067
7	Manfred Mustermann	01.01.12	1,23457E+18	3500	4178
8	Manfred Mustermann	01.01.12	012345678901a	99b	6132
9	Manfred Mustermann	01.01.12	1234567890	3500	4178

In CSV / HTML:  
Data types  
are wrong!

# Data Export

## Export with proper data types

### ► Plugins, e.g. by Anton Scheffer

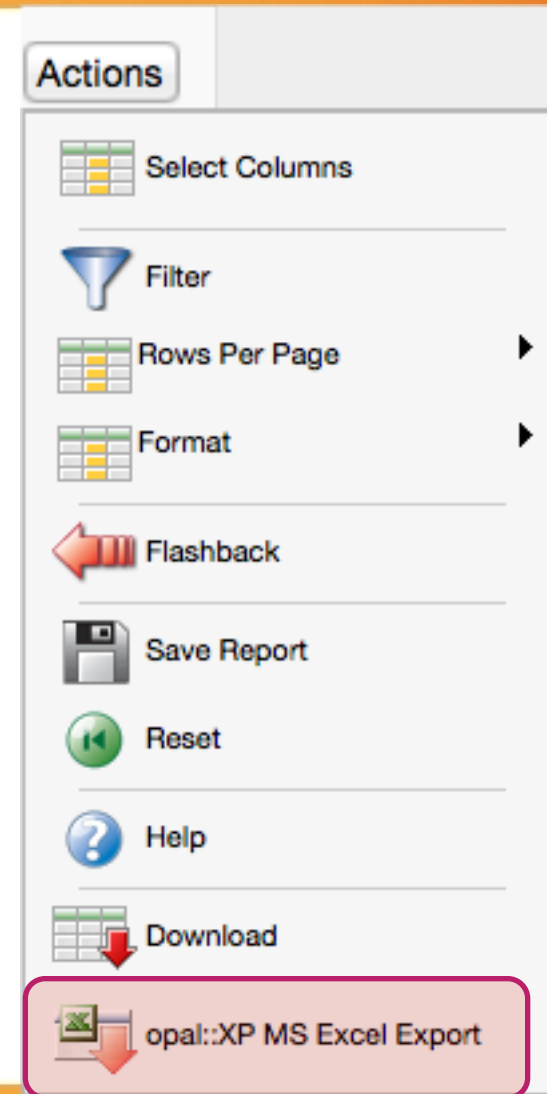
- [http://apex-plugin.com/oracle-apex-plugins/process-type-plugin/ir-report-to-excel-xlsx\\_74.html](http://apex-plugin.com/oracle-apex-plugins/process-type-plugin/ir-report-to-excel-xlsx_74.html)
- Exports with correct data types
- Max. 26 columns can be exported
- Does not respect:
  - The selected columns (and their order), the filter or the sort order
- Always just outputs the base sql statement of the interactive report

Customer	Customer Register	Customer Period	Sum Of Pur	Street	Street No	City	Zip	Country
Dietmar Au	1.Jan.2012	1.Jan.2012	10000,11	Zum Tilmes	11	Köln	50859	Deutschland
Manfred M	1.Jan.2013	1.Jan.2012	5000,11	Zum Tilmes	11a	Dresden	01067	Deutschland
Manfred M	1.Jan.2013	1.Jan.2012	5000,11	Am Markt	3500	Leipzig	04178	Deutschland
Manfred M	1.Jan.2013	1.Jan.2012	5000,11	Karlsruher	99b	Halle (Saale)	06132	Deutschland
Manfred M	1.Jan.2013	1.Jan.2012	5000,11	Am Markt	3500	Leipzig	04178	Deutschland

# Data Export

## Export with proper data types – OPAL::XP

- ▶ The new APEX 4.2 APIs allow us to retrieve runtime query of the interactive report:
- ▶ `APEX_IR.GET_REPORT`
- ▶ `APEX_IR.GET_LAST_VIEWED_REPORT_ID`
  
- ▶ Created a plugin for the interactive report using the OPAL::XP Publisher by OPAL-Consulting
- ▶ Added a dynamic action (plugin) to page 0, is automatically attached to all interactive reports in the application






# Data Export

## Export with proper data types – OPAL::XP

**Files**

File Prefix:

	File Name ▲	A	B
	dov	<b>OPAL::XP Master Template</b>	
	jdd	2	
	ter	3	
		4	<code>\$\$labels{alias_query_ie}</code>
		5	<code>\$\$columns{alias_query_ie}</code>
		6	

# Data Export

## Export with proper data types – OPAL::XP

- ▶ OPAL::XP (<http://www.opal-consulting.de/>)
- ▶ Templating approach to add data to your native MS Excel Sheet (.xls / .xlsx) on the fly
- ▶ The Concept:
  1. Provide 1...n SQL statements which can be referenced through an alias
    - E.g: `alias_d` for the order information:


```
SELECT product_name,  
       quantity,  
       order_timestamp,  
       category,  
       sales  
FROM demo_orders
```

2. Excel “Template” contains references to these queries and columns via : `${<query alias>.<column name>}`:

Day	Product Cat.	Sales
<code>\${alias_d.order_timestamp}</code>	<code>\${alias_d.category}</code>	<code>\${alias_d.sales}</code>
<b>Total</b>		<b><code>\$(SUM(D5))</code></b>

# Data Export

## Export with proper data types

	A	B	C	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
2	<b>Kurzauftrag für EC-Cash</b>																																									
4											<b>Telekom Shop Vertriebsgesellschaft mbH</b>										<b>Terminal-ID</b>																					
5	<b>Terminal-ID</b>										<b>Terminal-ID</b>										<b>1. Terminal-ID</b>																					
7	Wir bestellen hiermit nachfolgende Lieferungen/Dienstleistungen zu den																																									
8	umseitigen allgemeinen Geschäftsbedingungen der TeleCash sowie den																																									
9	Bedingungen für die Teilnahme am electronic cash System, bzw. den																																									
10	Bedingungen für die Teilnahme am System "Geldkarte" und den																																									
11	Händlerbedingungen für die Teilnahme am POZ-System.																																									
13	<b>Telefon: 089/899643-0, Fax: 089/899643-21</b>																																									
14	<b>Transact</b>										Elektronische Zahlungssysteme GmbH																															
16																																										
18																																										
20																																										
23	<b>1 Kunde</b>																																									
25	Firma:		Telekom Shop Vertriebsgesellschaft mbH																																							
27	Straße:		Terminal-ID																																							
29	PLZ/Ort:		Terminal-ID																																							
31	Telefon:		Terminal-ID										Fax:		Terminal-ID																											
33	Ansprechpartner:		Terminal-ID																																							
35	Telefon:		Terminal-ID										Fax:		Terminal-ID																											
37																																										
39	Installationsanschrift:																																									
41	Firma:		Telekom Shop Vertriebsgesellschaft mbH																																							
43	Straße:		Terminal-ID																																							
33	Terminal-Nr./ID:										Bank:																															
5	<b>5 eurocheque (ec)-Karten</b>																																									
7	Das TeleCash Terminal soll wie folgt konfiguriert sein:																																									
8	<input checked="" type="checkbox"/>		Wir wollen Zahlungen mit dem electronic-Cash-Verfahren																																							
9	abwickeln. (Garantierte Zahlungen mit online-Abfrage und																																									
10	Eingabe der Geheimzahl PIN)																																									
13	<b>6 Kredit-/Kunden- und sonstige Karten</b>																																									
14	Wir akzeptieren folgende Kreditkarten mit VU-Nr.:																																									
16	American Express										Terminal-ID																															
18	VISA/EUROCARD*										Terminal-ID																															
20	Vertragspartner: *=Citicorp;																																									
23	<b>8 Anschluß-Art</b>																																									
25	LAN																																									
27																																										
29																																										
31																																										
33	<b>9 Ausdruck auf dem Kassensstreifen</b>																																									
35	max. 24 Zeichen/Zeile, Breit 12Z/Z, insg. Max. 62 Zeichen																																									
37																																										
39	Text										normal																															
41	Telekom Shop Vertriebsgesellschaft										<input checked="" type="checkbox"/>																															
43	Terminal-ID										<input checked="" type="checkbox"/>																															
45	Terminal-ID										<input checked="" type="checkbox"/>																															

# Major Use Cases

## 3. Data Export

Day	Pr
30.09.12	Me
24.09.12	Ac
30.09.12	Ac
02.06.12	Ac
24.09.12	Wc
24.09.12	Ac
30.09.12	Wc
29.04.12	Ac
02.06.12	Ac
27.05.12	Ac
29.04.12	Me
29.04.12	Wc
27.04.12	Wc
29.04.12	Ac
14.05.12	Me
02.06.12	Me
29.04.12	Ac

### Shipping Note #11.0

**Customer** LaGuardia, Flushing  
**Order date** 24.09.12  
**Contact** JDD

**Shipments**

#	Product name	Description	Quantity
0	Belt	Leather belt	2
1	Wallet	Travel wallet suitable for men and women. Several com	1
2	Blouse	Silk blouse ideal for all business women	1
<b>3</b>	<b>positions</b>		<b>4</b>

Gesamtergebnis
180 €
170 €
2.380 €
905 €
1.640 €
1.060 €
950 €
1.090 €
730 €
870 €
1.515 €
1.890 €
<b>13.380 €</b>

APR 2012   MAY 2012   JUN 2012   SEP 2012



# Data Export

## Export with proper data types

- ▶ Use MS Excel to format your export
- ▶ Correct data type export
- ▶ Usage of native MS Excel features: Export multiple worksheets at the same time, autofilter, macros, conditional formatting, Show / hide columns, Charts, Pivot-tables, password protection for files and worksheets
- ▶ Includes template syntax to support more complex template structures, but the simple approach is in most cases absolutely sufficient
- ▶ Architecture: Uses external web service, communication via utl\_http
- ▶ License:
  - 1500€ per dedicated application (ASFU)
  - 7500€ per server
- ▶ Prototype implementation included for the first implementation!

# Discussion

- ▶ At the clients you will find a colorful mix of all the solutions
  - PL/PDF used quite often
  - People shy away from requesting additional infrastructure, the DB “people” prefer solutions with less moving parts => thus prefer a pl/sql only solution
  
- ▶ It all depends on your use case and context
  - Is the reporting used for APEX only?
  - Do you need batch processing?
  - Is the development of the reports independent of the APEX development? Who does it?
  - Can we use a J2EE server for the additional functionality?
  
- ▶ Oracle BI Publisher
  - Perfect fit for the different use cases
  - Just very expensive

# Discussion

- ▶ Personally, I would use different tools to handle the different output formats:
  - PDF, MS Word, MS Excel
- Why?
  - Completely different use cases
  - The generated MS Word or MS Excel is not native and cannot be easily changed
- ▶ When evaluating, TRY to implement YOUR maximum requirements
  - Which formats for what purpose? PDF, MS Word and MS Excel required?
  - Multi-language capable? NLS (number, dates) and Labels?
  - Formatting?
  - Multiple queries (master-detail-detail, etc.)?
  - Using images as Blobs or via URLs?

# Discussion

- ▶ Use a pragmatic approach, use what is already there => URL based integration using an existing infrastructure.
- ▶ I always like to question whether you actually NEED PDF, MS Word or true MS Excel, because it is difficult and costly.
- ▶ Creating a pixel perfect design for PDF is **PAINFUL**.

# Q&A

Dietmar Aust  
Opal-Consulting, Köln

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